

## CLAIM AMENDMENTS

This listing of claims will replace all prior versions, and listing, of claims in the application:

### Method of Detecting Coliform Bacteria from Reflected Light

#### General Measurement and Correlation/Estimation Method

1. (Original) A method of determining the presence of coliform bacteria in water from light reflected therefrom, said method comprising the steps of:
  - (a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least three frequency ranges (i) from about  $0.53\ \mu\text{m}$  to about  $0.60\ \mu\text{m}$  ; (ii) from about  $0.63\ \mu\text{m}$  to about  $0.69\ \mu\text{m}$ ; and (iii) from about  $0.76\ \mu\text{m}$  to about  $0.90\ \mu\text{m}$ ; and
  - (b) relating the approximate amount of said coliform in said water to said respective amounts of light by applying an algorithm relating said respective amounts of light in said at least three frequency ranges to the amount of coliform bacteria in said water.
2. (Original) A method according to claim 1 wherein said at least three frequency ranges are all in the visible-reflective IR range.
3. (Original) A method according to claim 1 wherein said algorithm comprises a linear relationship between said approximate amount of said coliform in said water and the sum of (a) the ratio of one of said light measurements to a second of said light measurements and (b) the ratio of the second of said light measurements to the third of said light measurements.

4. (Original) A method according to claim 1 wherein said at least three frequency ranges are all within the detectable range of a silicon detector.
5. (Original) A method according to claim 1 wherein said measurement of the amount of light in said at least three frequency ranges comprises the measurement, respectively, of: (i) LANDSAT TM band 2, (ii) LANDSAT TM band 3 and (iii) LANDSAT TM band 4.
6. (Original) A method according to claim 1 wherein said algorithm is any algorithm selected from the group consisting of:  $X \approx K_1 + K_2 \times (R32) + K_3 \times (R43)$  wherein:
  - X is the approximate amount of coliform bacteria expressed in colonies per milliliter;
  - $K_1$  is a value in the range of from about -175 to about -350;
  - $K_2$  is a value in the range of from about 250 to about 350;
  - $K_3$  is a value in the range of from about 200 to about 350;
  - R32 is the value of LANDSAT TM band 3 divided by LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band; and
  - R43 is the value of LANDSAT TM band 4 divided by LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band.
7. (Original) A method according to claim 6 wherein:
  - X is the amount of coliform bacteria expressed in colonies per milliliter;
  - $K_1$  is a value in the range of from about -200 to about -300;
  - $K_2$  is a value in the range of from about 275 to about 325;
  - $K_3$  is a value in the range of from about 225 to about 275;

R32 is the value of the amount of light of LANDSAT TM band 3 divided by the value of the amount of light of LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band; and

R43 is the value of the amount of light of LANDSAT TM band 4 divided by the value of the amount of light of LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band.

8. (Original) A method according to claim 6 wherein:

X is the amount of coliform bacteria expressed in colonies per milliliter;

K<sub>1</sub> is a value in the range of from about -265 to about -275;

K<sub>2</sub> is a value in the range of from about 300 to about 320;

K<sub>3</sub> is a value in the range of from about 225 to about 275;

R32 is the value of the amount of light of LANDSAT TM band 3 divided by the value of the amount of light of LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band; and

R43 is the value of the amount of light of LANDSAT TM band 4 divided by the value of the amount of light of LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band.

9. (Original) A method according to claim 1 wherein the calculated value of coliform correlates to the actual measured amount of said coliform in said water by a correlation value in excess of 60%.

10. (Original) A method according to claim 1 wherein the calculated value of coliform correlates to the actual measured amount of said coliform in said water by a correlation value in excess of 80%.

11. (Original) A method according to claim 5 wherein the calculated value of X correlates to the actual measured amount of said coliform in said water by a correlation value in excess of 60%.

12. (Original) A method according to claim 5 wherein the calculated value of X correlates to the actual measured amount of said coliform in said water by a correlation value in excess of 80%.

13. (Original) A method according to claim 1 additionally comprising the step of generating a report of said approximate amount of said coliform in said water.

14. (Original) A method according to claim 5 additionally comprising the step of generating a report of said approximate amount of said coliform in said water.

15. (Original) A method according to claim 1 additionally comprising the step of transmitting data relating to the approximate amount of said coliform in said water to a site remote from the site where said measurement takes place.

16. (Original) A method according to claim 5 additionally comprising the step of transmitting data relating to the approximate amount of said coliform in said water to a site remote from the site where said measurement takes place.

17. (Original) A method of determining the presence of coliform bacteria in water from light reflected therefrom, said method comprising the steps of:

(a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least three frequencies comprising, respectively: (i) LANDSAT TM band 2, (ii) LANDSAT TM band 3 and (iii) LANDSAT TM band 4; and (b) relating the approximate amount of said coliform in said water to said respective amounts of light by applying an algorithm

relating said respective amounts of light in said at least three frequency ranges to the amount of coliform bacteria in said water, wherein said algorithm is any algorithm selected from the group consisting of:  $X \approx K_1 + K_2 \times (R32) + K_3 \times (R43)$  wherein:

X is the approximate amount of coliform bacteria expressed in colonies per milliliter;

$K_1$  is about -270;

$K_2$  is about 315;

$K_3$  is about 250;

R32 is the value of the amount of light of LANDSAT TM band 3 divided by the value of the amount of light of LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band; and

R43 is the value of the amount of light of LANDSAT TM band 4 divided by the value of the amount of light of LANDSAT TM band 3, after subtraction for atmospheric haze separately in each band.

A method according to claim 1 additionally comprising the step of transmitting data relating to the approximate amount of said coliform in said water to a site remote from the site where said measurement takes place.

18. (Original) A method according to claim 17 additionally comprising the step of generating a report of said approximate amount of said coliform in said water.

19. (Original) A method according to claim 17 additionally comprising the step of transmitting data relating to the approximate amount of said coliform in said water to a site remote from the site where said measurement takes place.

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94. (New) A method of determining the presence of coliform bacteria in water from light reflected therefrom, said method comprising the steps of:
- (a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least three frequency ranges (i) from about  $0.53\ \mu\text{m}$  to about  $0.60\ \mu\text{m}$ ; (ii) from about  $0.63\ \mu\text{m}$  to about  $0.69\ \mu\text{m}$ ; and (iii) from about  $0.76\ \mu\text{m}$  to about  $0.90\ \mu\text{m}$ .
  - (b) transmitting data relating to said measurement to a site remote from said measurement device and
  - (c) relating the approximate amount of said coliform in said water to said respective amounts of light at said remote site by applying an algorithm relating said respective amounts of light in said at least three frequency ranges to the amount of coliform bacteria in said water.
95. (New) A method according to claim 94 additionally comprising the step of generating a report of said approximate amount of said coliform in said water.

Method of Detecting E. Coli. from Reflected Light

General Measurement and Correlation/Estimation Method

96. (New) A method of determining the presence of E. Coli. in water from light reflected therefrom, said method comprising the steps of:

- (a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least three frequency ranges: (i) from about  $0.52 \mu\text{m}$  to about  $0.60 \mu\text{m}$ ; (ii) from about  $0.76 \mu\text{m}$  to about  $0.90 \mu\text{m}$ ; and (iii) from about  $1.55 \mu\text{m}$  to about  $1.75 \mu\text{m}$ ; and
- (b) relating the approximate amount of said E. Coli. in said water to said respective amounts of light by applying an algorithm relating said respective amounts of light in said at least three frequency ranges to the amount of E. Coli. colonies in said water.

97. (New) A method according to claim 1 wherein said measurement of the amount of light in said at least three frequency ranges comprises the measurement, respectively, of: (i) LANDSAT TM band 2, (ii) LANDSAT TM band 4, and (iii) LANDSAT TM band 5.

98. (New) A method according to claim 96 wherein said algorithm is any algorithm selected from the group consisting of  $X \approx K_1 + K_2 \times (R42) - K_3 \times (R52) + K_4 \times (R54)$  and equivalents wherein:

X is the approximate amount of E. Coli. expressed in colonies per 100 ml;

$K_1$  is a value in the range of from about -220 to about -420;

$K_2$  is a value in the range of from about 1750 to about 1950;

$K_3$  is a value in the range of from about 1130 to about 1330;

$K_4$  is a value in the range of from about 100 to about 300;

R42 is the value of LANDSAT TM band 4 divided by LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band;

R52 is the value of LANDSAT TM band 5 divided by LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band; and

R54 is the value of LANDSAT TM band 5 divided by LANDSAT TM band 4, after subtraction for atmospheric haze separately in each band.

99. (New) A method according to claim 98 wherein:

$K_1$  is a value in the range of from about -300 to about -400;

$K_2$  is a value in the range of from about 1825 to about 1875;

$K_3$  is a value in the range of from about 1170 to about 1290;

$K_4$  is a value in the range of from about 175 to about 250;

100. (New) A method according to claim 98 wherein:

$K_1$  is a value in the range of from about -310 to about -330;

$K_2$  is a value in the range of from about 1860 to about 1870;

$K_3$  is a value in the range of from about 1220 to about 1250; and

$K_4$  is a value in the range of from about 200 to about 220.

101. (New) A method according to claim 96 wherein the calculated value of E. Coli. correlates to the actual measured amount of said E. Coli. in said water by a correlation value in excess of 60%.

102. (New) A method according to claim 96 wherein the calculated value of E. Coli. correlates to the actual measured amount of said E. Coli. in said water by a correlation value in excess of 70%.

103. (New) A method according to claim 100 wherein the calculated value of X

correlates to the actual measured amount of said E. Coli. in said water by a correlation value in excess of 60%.

104. (New) A method according to claim 100 wherein the calculated value of X correlates to the actual measured amount of said E. Coli. in said water by a correlation value in excess of 70%.

105. (New) A method according to claim 96 additionally comprising the step of transmitting data relating to the approximate amount of said E. Coli. in said water to a site remote from the site where said measurement takes place.

106. (New) A method according to claim 100 additionally comprising the step of transmitting data relating to the approximate amount of said E. Coli. in said water to a site remote from the site where said measurement takes place.

107. (New) A method of determining the presence of E. Coli. in water from light reflected therefrom, said method comprising the steps of:

(a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least three frequencies comprising, respectively: (i) LANDSAT TM band 2, (ii) LANDSAT TM band 3, and (iii) LANDSAT TM band 5; and (b) relating the approximate amount of said E. Coli. in said water to said respective amounts of light by applying an algorithm relating said respective amounts of light in said at least three frequency ranges to the amount of E. Coli. in said water, wherein said algorithm is any algorithm selected from the group consisting of  $X \approx K_1 + K_2 \times (R42) - K_3 \times (R52) + K_4 \times (R54)$  and equivalents wherein:

X is the approximate amount of E. Coli. expressed in colonies per 100 ml;

$K_1$  is a value of about -321;

$K_2$  is a value of about 1864;

$K_3$  is a value of about 1235;

$K_4$  is a value of about 213;

R42 is the value of LANDSAT TM band 4 divided by LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band;

R52 is the value of LANDSAT TM band 5 divided by LANDSAT TM band 2, after subtraction for atmospheric haze separately in each band; and

R54 is the value of LANDSAT TM band 5 divided by LANDSAT TM band 4, after subtraction for atmospheric haze separately in each band.

108. (New) A method according to claim 96 additionally comprising the step of generating a report of said approximate amount of said E. Coli.

109. (New) A method according to claim 96 additionally comprising the step of transmitting data relating to the approximate amount of said E. Coli. expressed in micrograms per liter in said water to a site remote from the site where said measurement takes place.

Measurement Method followed by Transmission to Remote Processing Site

110. (New) A method of determining the presence of E. Coli. in water from light reflected therefrom, said method comprising the steps of:

- (a) obtaining a measurement of reflected light from said water, said measurement comprising a measurement of the respective amount of light in at least three frequency ranges: (i) from about  $0.52\ \mu\text{m}$  to about  $0.60\ \mu\text{m}$ ; (ii) from about  $0.76\ \mu\text{m}$  to about  $0.90\ \mu\text{m}$ ; and (iii) from about  $1.55\ \mu\text{m}$  to about  $1.75\ \mu\text{m}$ ;

- (b) transmitting data relating to said measurement to a site remote from said measurement device; and
- (c) relating the approximate amount of said E. Coli. in said water to said respective amounts of light at said remote site by applying an algorithm relating said respective amounts of light in said at least three frequency ranges to the amount of E. Coli. in said water.

111. (New) A method according to claim 110 additionally comprising the step of generating a report of said approximate amount of said E. Coli. in said water.